

Spiral Review

Find any asymptotes, intercepts, domain and range.

1.) $y = 3^{x-2} + 1$

HA: $y = 1$

y-int: $(0, \frac{10}{9})$

domain: $(-\infty, \infty)$

range: $(1, \infty)$

2.) $y = 2 - \log_{10} x$

VA: $x = 0$

x-int: $(100, 0)$

$0 = 2 - \log_{10} x$
 $-2 - 2$

domain: $(0, \infty)$ $-2 = -\log_{10} x$

range: $(-\infty, \infty)$ $2 = \log_{10} x$

$10^2 = x$

$x = 100$

p.210 3.4 Solving Exponential and Logarithmic Equations

To solve logarithmic equations:

- 1.) If given natural log (ln), change base to e.
- 2.) If there are logs on both sides, drop the logs and solve.
- 3.) If there is only one log, change to exponential form and solve.

****If you have more than one answer, you must check to see that the solution works in the original equation.**

Students will be able to solve a logarithmic equation.

Example 1: Solve the logarithmic equation.

a.) $\ln x - \ln 2 = 0$

$$\ln \frac{x}{2} = 0$$

$$e^{\ln \frac{x}{2}} = e^0$$

$$\frac{x}{2} = 1 \cdot 2$$

$$x = 2$$

b.) $\ln x = -14$

$$e^{\ln x} = e^{-14}$$

$$x = e^{-14}$$

$$x = 8.315 \cdot 10^{-7}$$

c.) $\log_9 81 = 2$

$$x^2 = 81$$

$$x = \pm 9$$

$$x = 9$$

Check

$$\sqrt{\log_9 81} = 2?$$

$$x \log_9 81 = 2?$$

d.) $\ln(3x + 5) = 8$

$$e^{\ln(3x+5)} = e^8$$

$$3x + 5 = e^8$$

$$3x = e^8 - 5$$

$$x = \frac{e^8 - 5}{3}$$

$$x = 991.986$$

Students will be able to solve a logarithmic equation.

e.) $\log_9(4 + x) = \log_9 2x$

$$\frac{4+x}{-x} = \frac{2x}{-x}$$

$$4 = x$$

f.) $\log_{12} x^2 = 6$

$$\sqrt{12^6} = \sqrt{x^2}$$

$$\pm 12^3 = x$$

$$\pm 1728 = x$$

$$x = 1728$$

$\sqrt{\log_{12} 1728} = 6$

$x \log_{12} (1728) = 6$

g.) $\log_3 x + \log_3(x - 8) = 2$

$$\log_3 x(x-8) = 2$$

$$3^2 = x(x-8)$$

$$9 = x^2 - 8x - 9$$

$$0 = x^2 - 8x - 9$$

$$0 = (x-9)(x+1)$$

$$x = 9, x = -1$$

h.) $3 + 2\ln x = 10$

$$\frac{2\ln x}{2} = \frac{7}{2}$$

$$\ln x = \frac{7}{2}$$

$$e^{\ln x} = e^{\frac{7}{2}}$$

$$x = e^{\frac{7}{2}}$$

$$x = 33.115$$

Students will be able to solve real-life application problems.

Example 2: Use the formula for continuous compounding, to find the time required for the balance to double or triple.

$$A = Pe^{rt}$$

a.) $r = 6\%$, how long for a \$1000 investment to double?

A = amount we want

P = principle (invest)

r = rate (change to decimal)

t = time (years)

$$\frac{2000}{1000} = \frac{1000e^{.06t}}{1000}$$

$$2 = e^{.06t}$$

$$\ln 2 = \ln e^{.06t}$$

$$\frac{\ln 2 = .06t}{.06 \quad .06}$$

$$t = 11.552 \text{ yrs}$$

b.) Triple?

$$\frac{3000}{1000} = \frac{1000e^{.06t}}{1000}$$

$$3 = e^{.06t}$$

$$\ln 3 = \ln e^{.06t}$$

$$\frac{\ln 3 = .06t}{.06 \quad .06}$$

$$t = 18.31 \text{ yrs}$$

Turn-in:

p.217 (44, 96, 102, 106)

HW:

p.217 (37-45, 93-113, 143-147 odds)